Trade-off Between Forage Quantity and Quality On Prairie Dog Towns

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Photo by Terri Harris BGNG

Contrasting Grazers (60 to 64% Dietary Overlap)

- **Consume large quantities of low quality forage (26 lbs/day)***
- **Fecal Material: large pies deposited in one place**

- **Consume small quantities of high quality forage (0.07 lbs/day)***
- **Fecal Material: small pellets spread over larger area**

*Miller et al. 2007. Journal of Wildlife Management 71:2801-2810

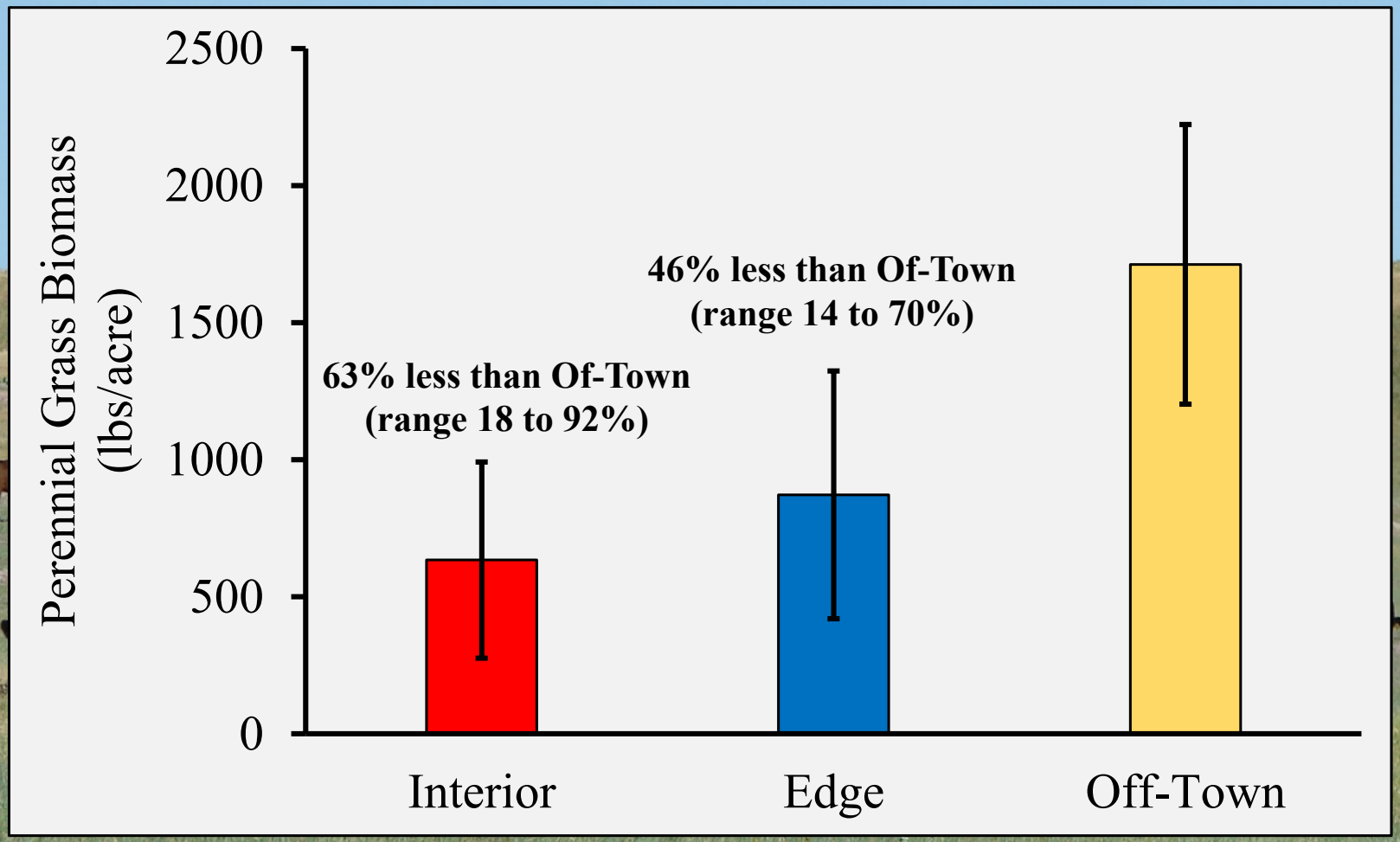
Differences in Forage Amount between On Colony and Off Colony

On Colony = Livestock + Prairie Dogs
Off Colony = Livestock

Perennial Grass Biomass on Buffalo Gap NG

On Colony = Livestock + Prairie Dogs

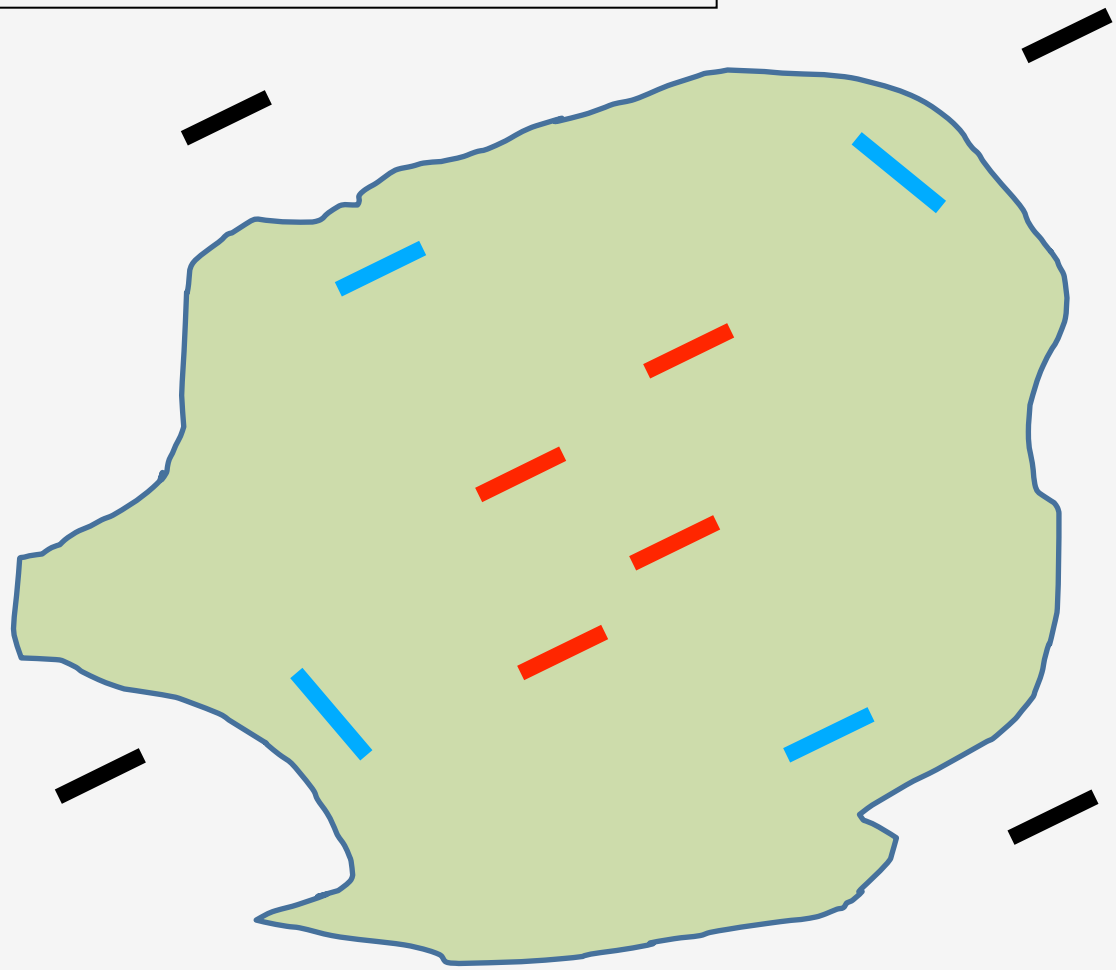
Off Colony = Livestock



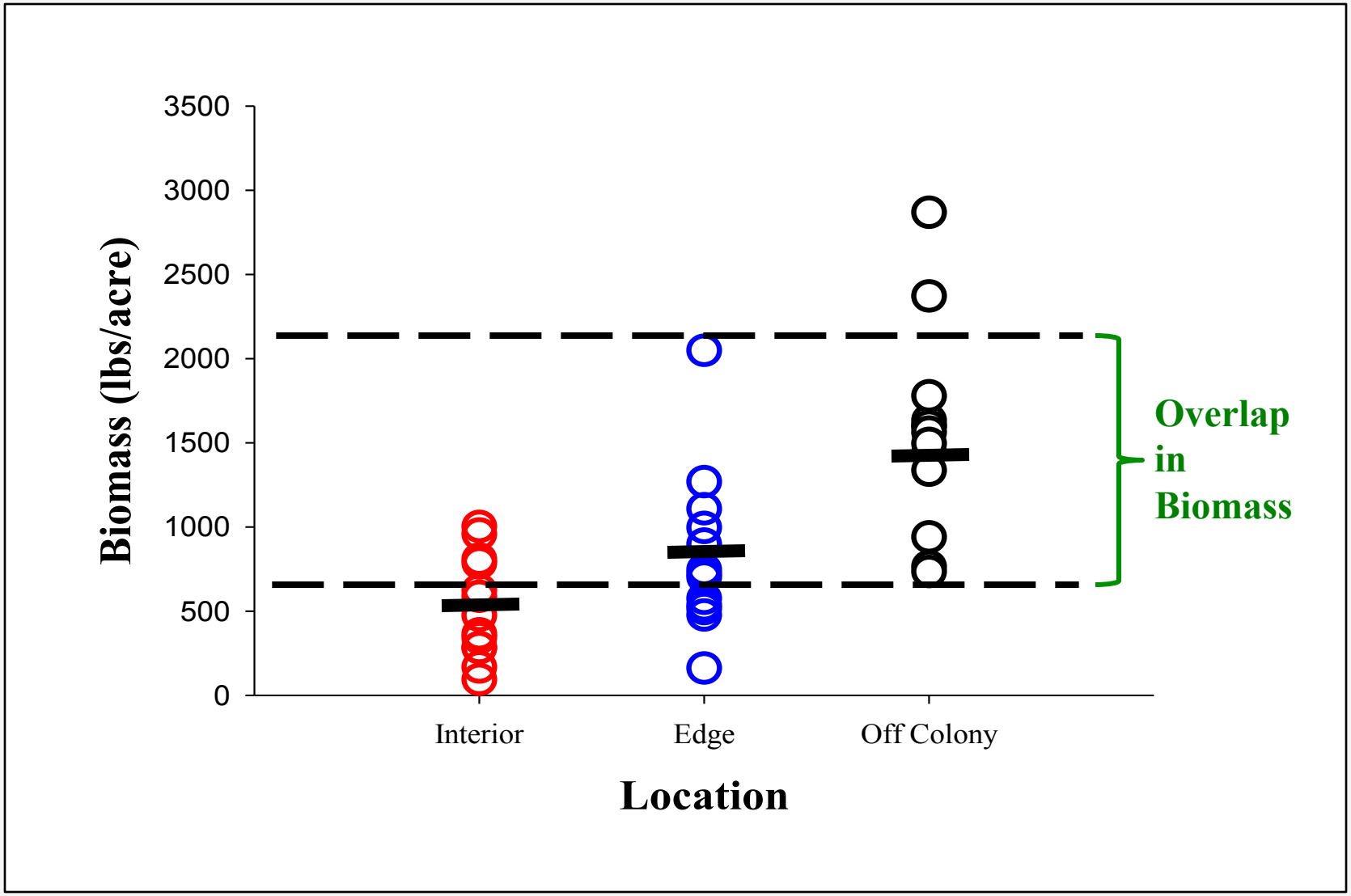
On- and Off-Town Biomass: Buffalo Gap National Grassland

Sampling Stratified by Location: Interior, Edge, Off Town

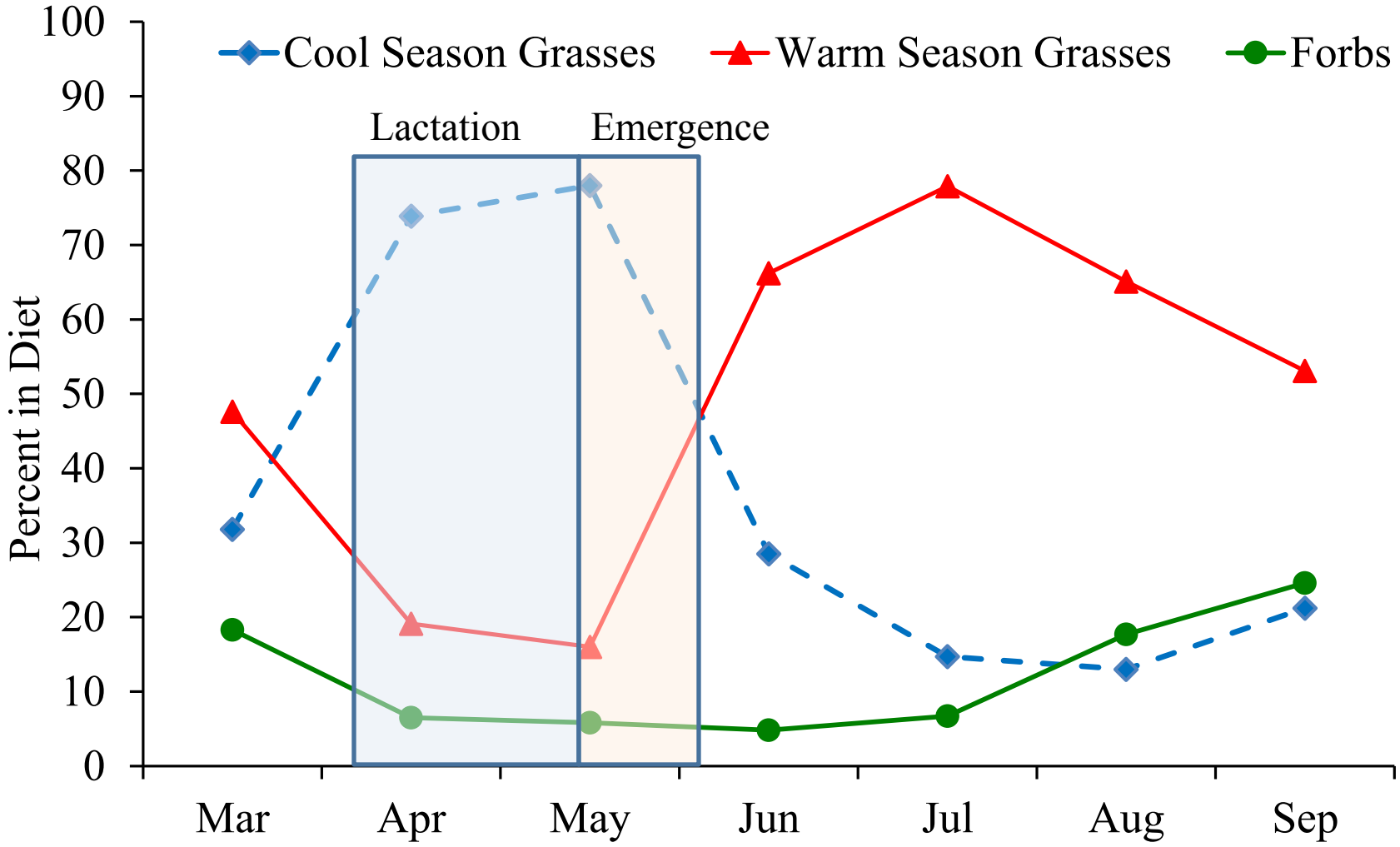
Mid June – late August, 2010
(Precipitation ≈ 1.0 inch above normal)



Perennial Graminoid Biomass Buffalo Gap NG



BTPD Seasonal Diet Selection



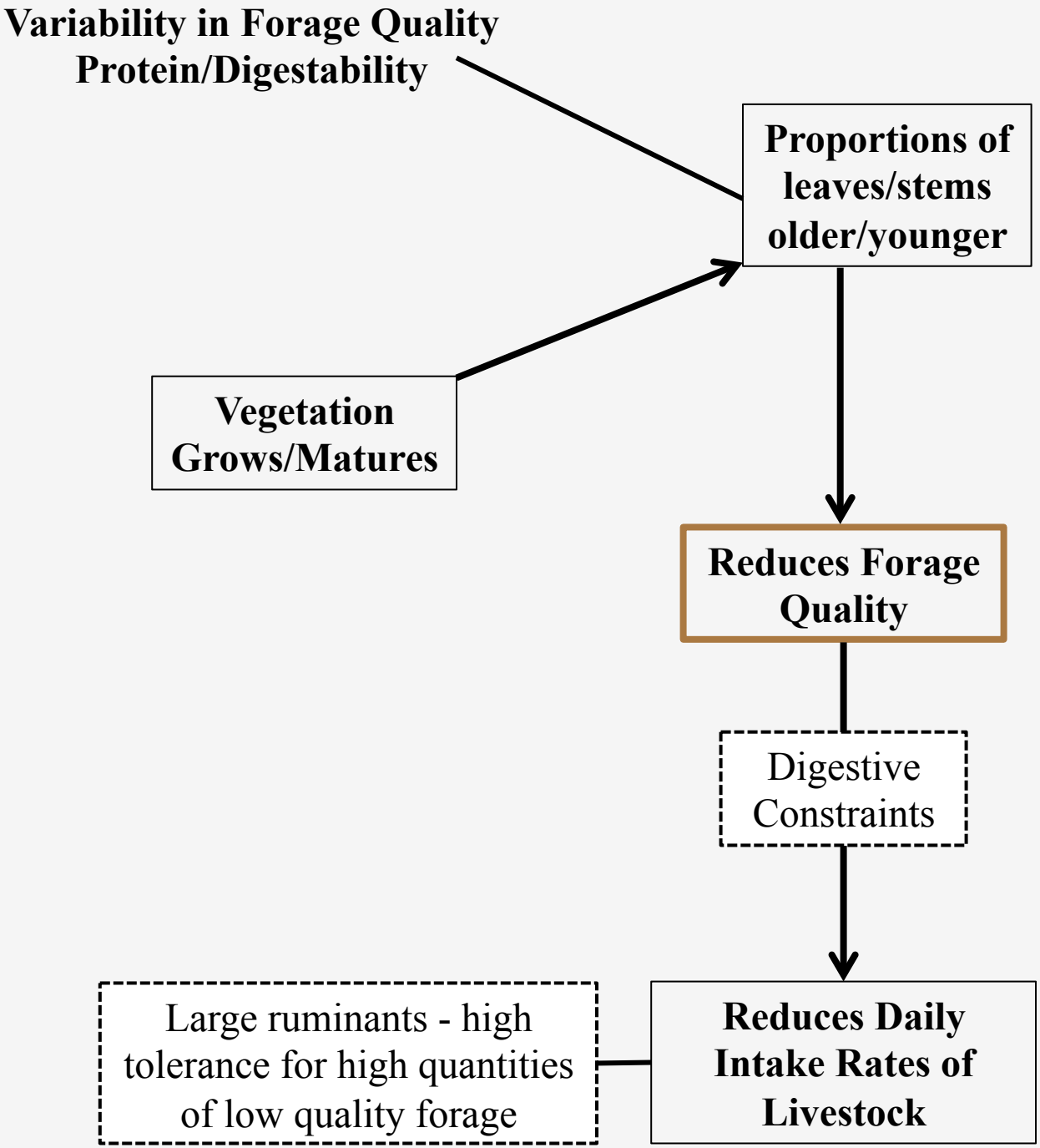
Source: Uresk, D.W. 1984. Black-tailed prairie dog food habits and forage relationships in western South Dakota. Journal of Range Management 37: 325-329.

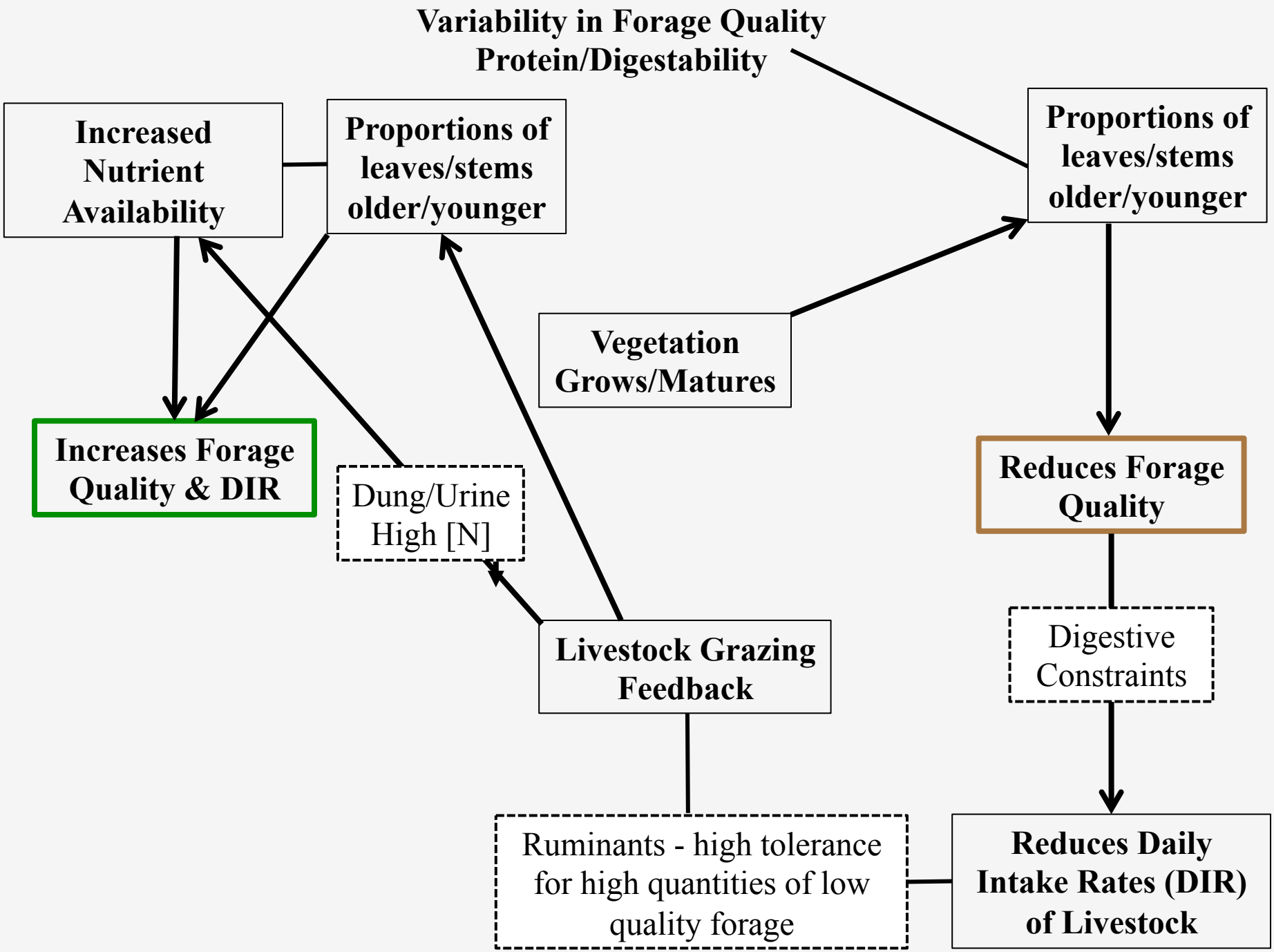
Forage Quantity and Quality

Growing Season

Quantity – Low to High

Quality – High to Low


Variability in Forage Quality
Protein/Digestability
Proportions of leaves/stems older/younger
Vegetation Grows/Matures
Reduces Forage Quality
Digestive Constraints
Reduces Daily Intake Rates of Livestock
Large ruminants - high tolerance for high quantities of low quality forage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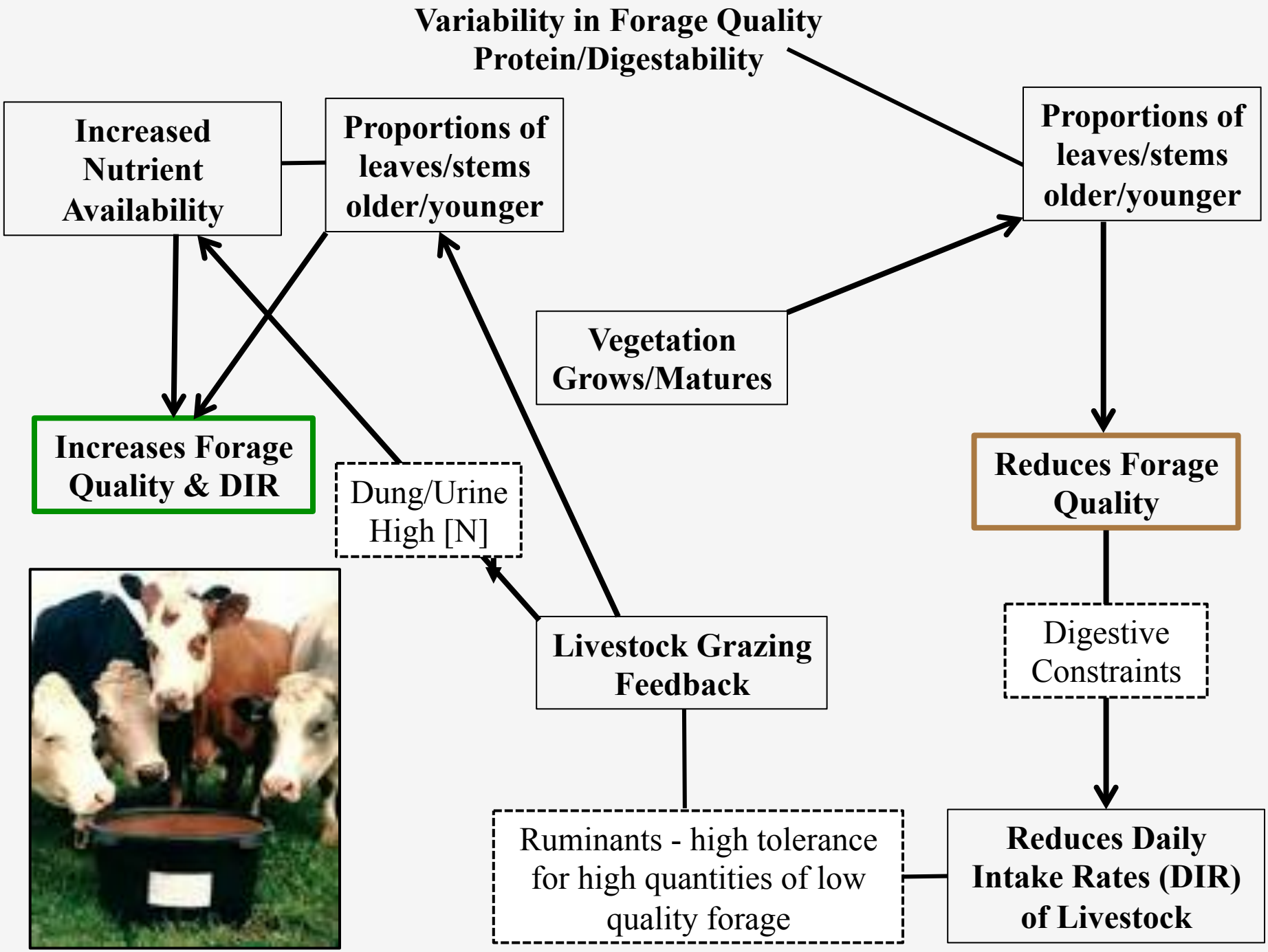
Vegetation Grows/Matures
Increases Forage Quality & DIR
Dung/Urine High [N]
Reduces Forage Quality
Livestock Grazing Feedback
Digestive Constraints
Ruminants - high tolerance for high quantities of low quality forage
Reduces Daily Intake Rates (DIR) of Livestock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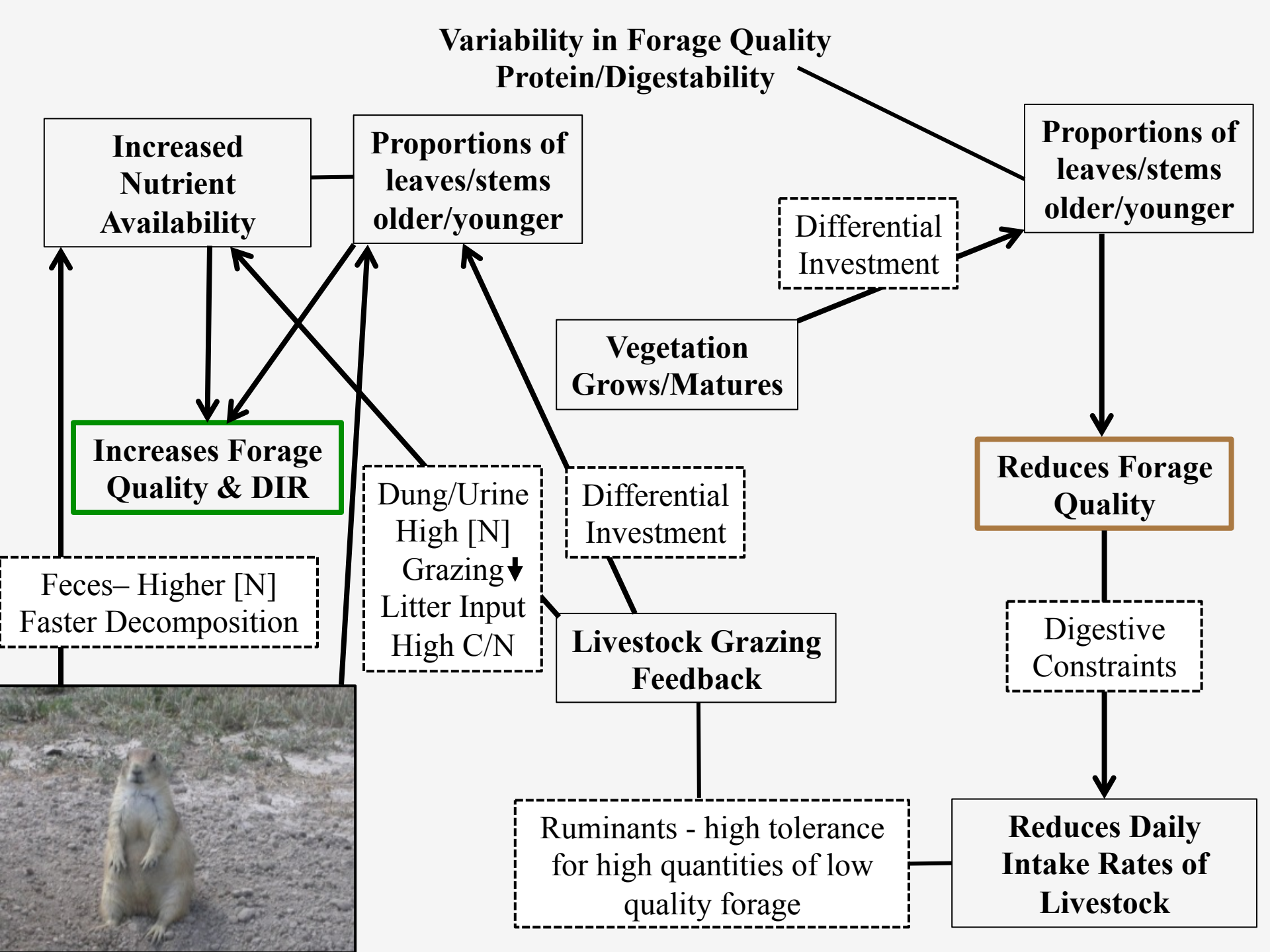
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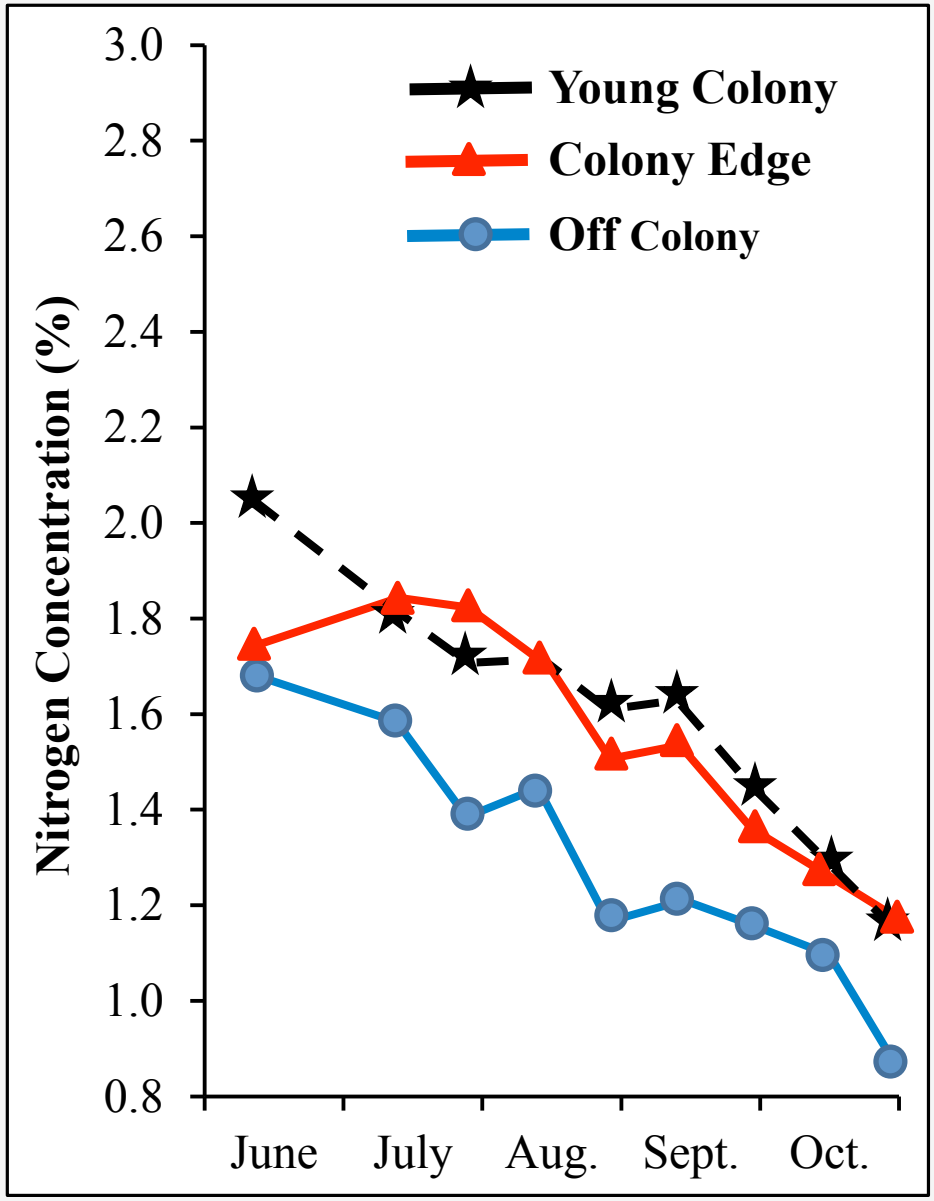
Differential Investment
Vegetation Grows/Matures
Increases Forage Quality & DIR
Reduces Forage Quality
Dung/Urine
High [N]
Grazing
Litter Input
High C/N
Differential Investment
Feces– Higher [N]
Faster Decomposition
Livestock Grazing Feedback
Digestive Constraints
Ruminants - high tolerance for high quantities of low quality forage
Reduces Daily Intake Rates of Livestock



Nitrogen Concentration in Graminoids in a PD Colony in Wind Cave National Park, SD.

Young Colony = Colonized 3 to 8 years

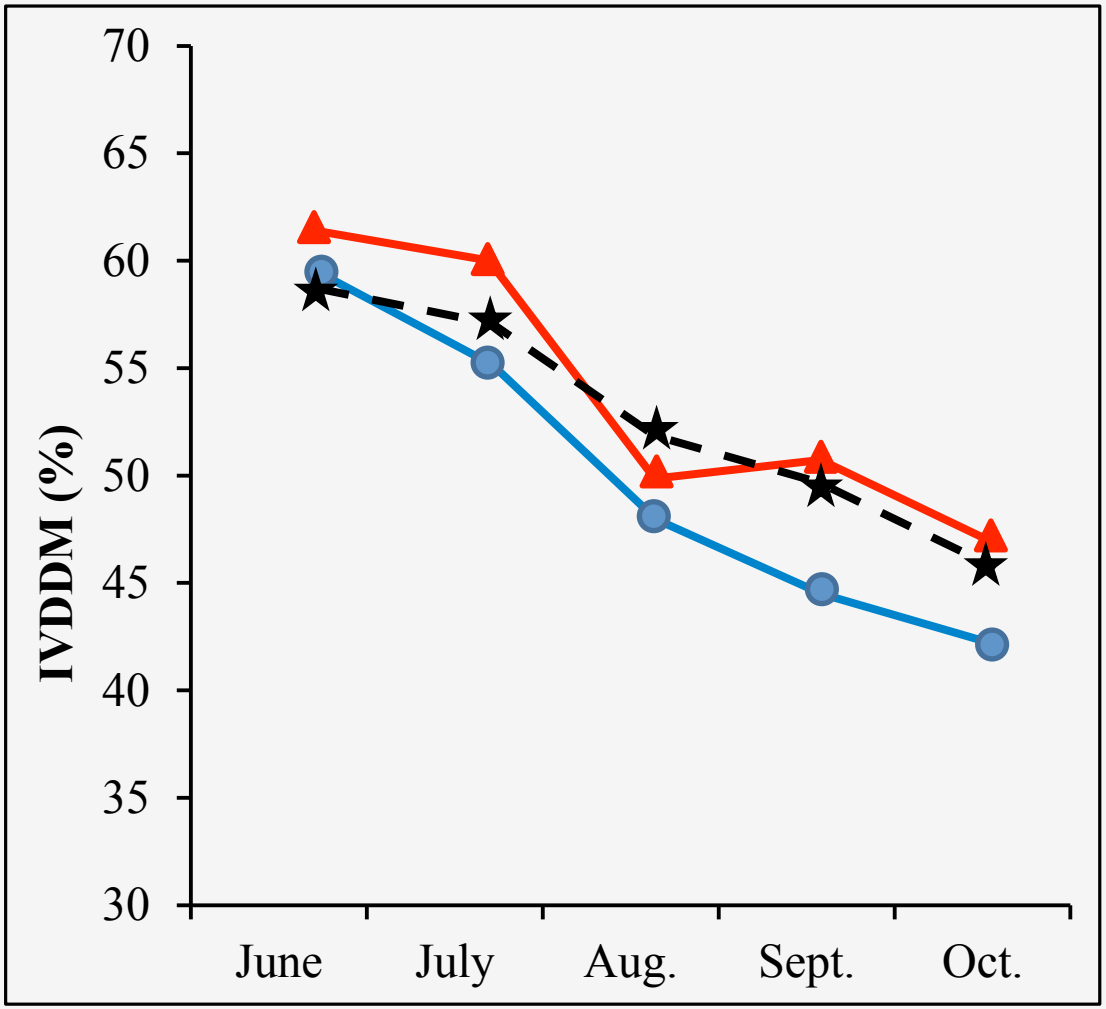
Colony Edge = Colonized ≤ 2 years

Nitrogen Concentration (leaves & stems)

On Colony > Off Colony

Coppock et al. 1983. Plant-herbivore interactions in a North American mixed-grass prairie. I. Effects of black-tailed prairie dogs on intraseasonal aboveground plant biomass and nutrient dynamics and plant species diversity. Oecologia 56:1-9.

In vitro Digestible Dry-Matter (IVDDM)



Young Colony (3 – 8 yrs)

Colony Edge (≤ 2 yrs)

Off Colony

IVDDM
On Colony > Off Colony

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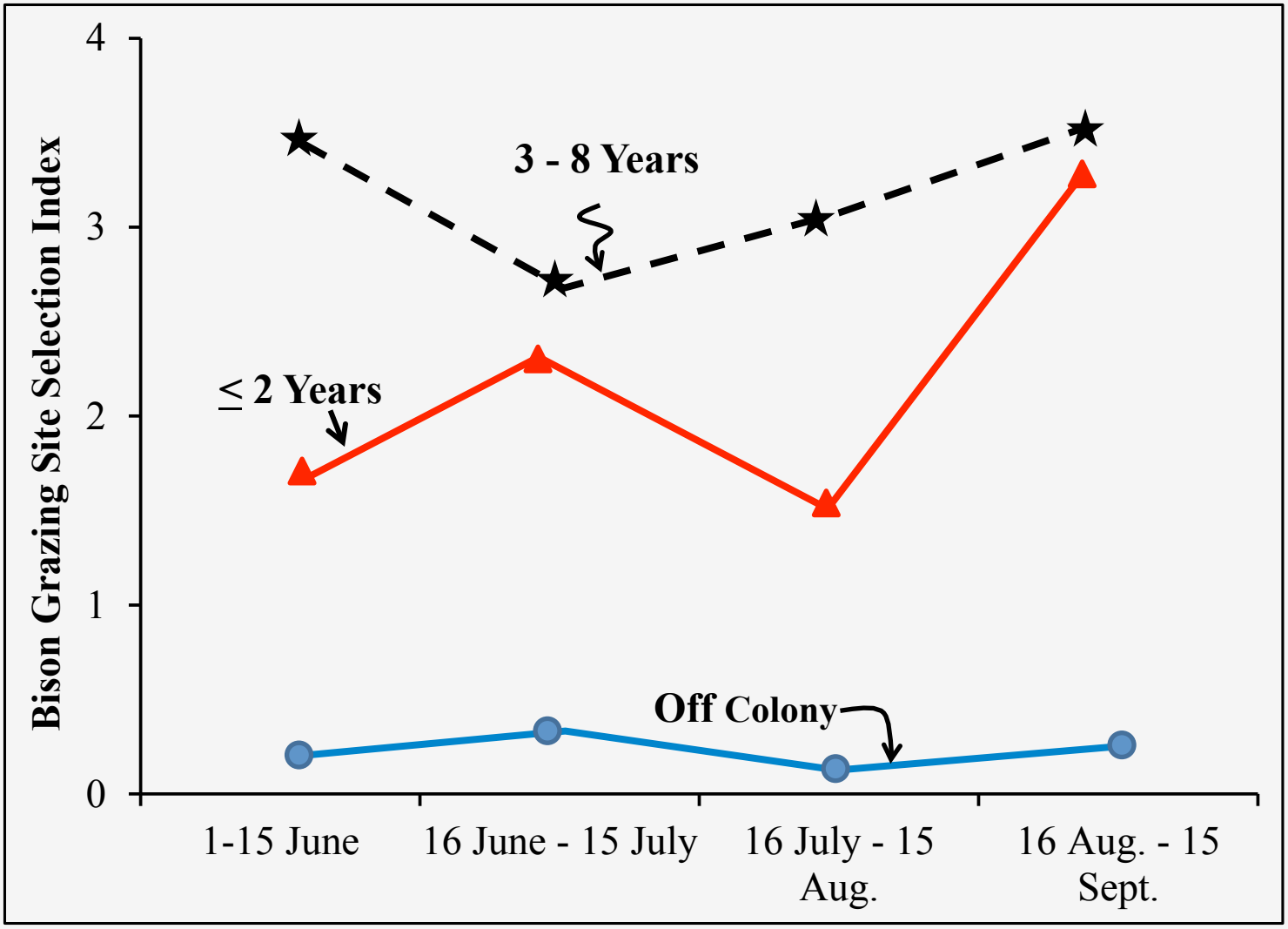
Bison Habitat Selection in Wind Cave National Park, SD.

> 1 represents site selection; < 1 represents site avoidance

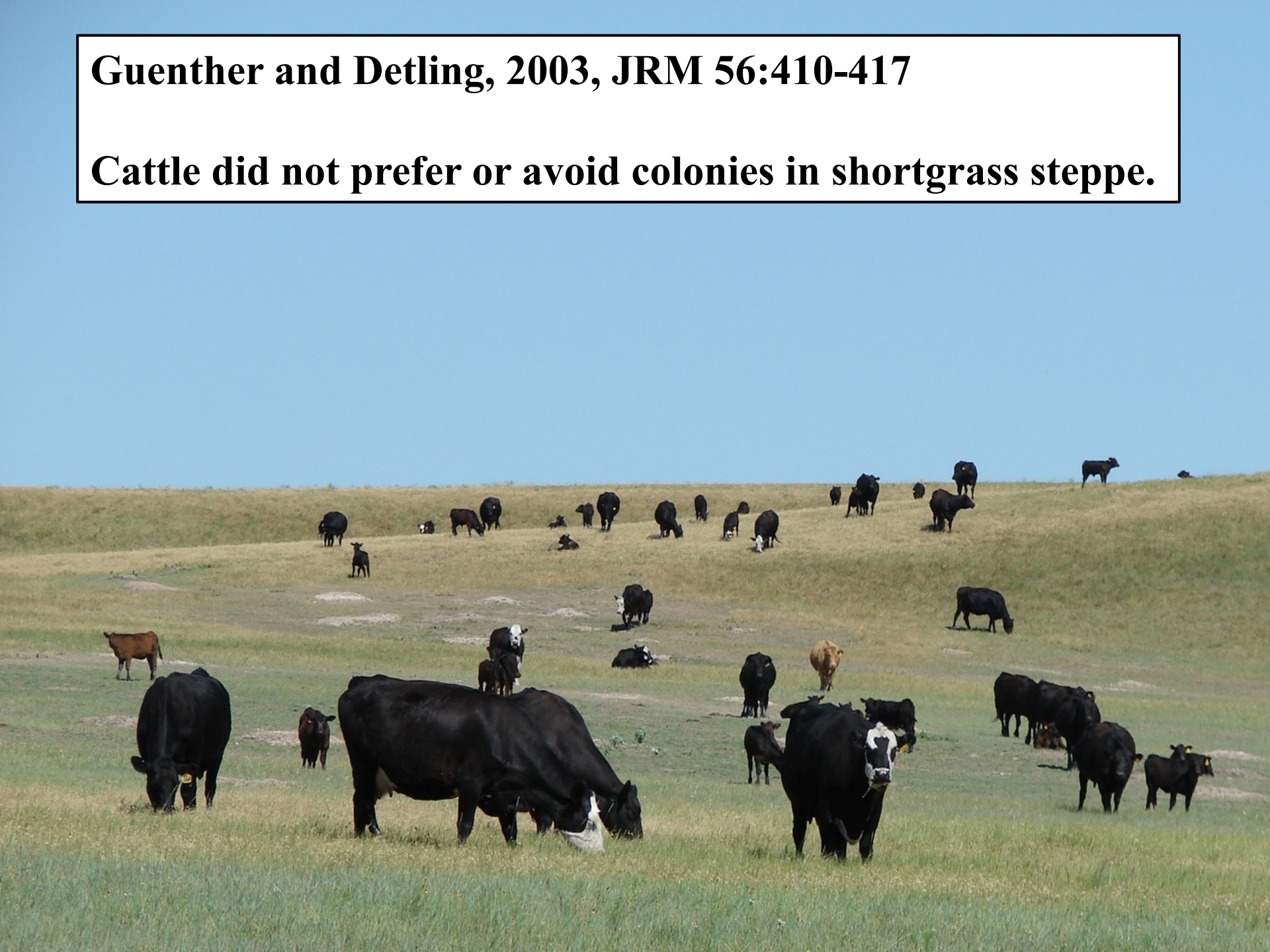


Coppock et al. 1983. Plant-herbivore interactions in a North American mixed-grass prairie. II. Responses of bison to modification of vegetation by prairie dogs. Oecologia 56:10-15.

Buffalo Gap National Grassland (Wall, SD)

Guenther and Detling, 2003, JRM 56:410-417

Cattle did not prefer or avoid colonies in shortgrass steppe.



Higher forage quality On Town

Does higher forage quality offset lower forage quantity?

Short Answer: No

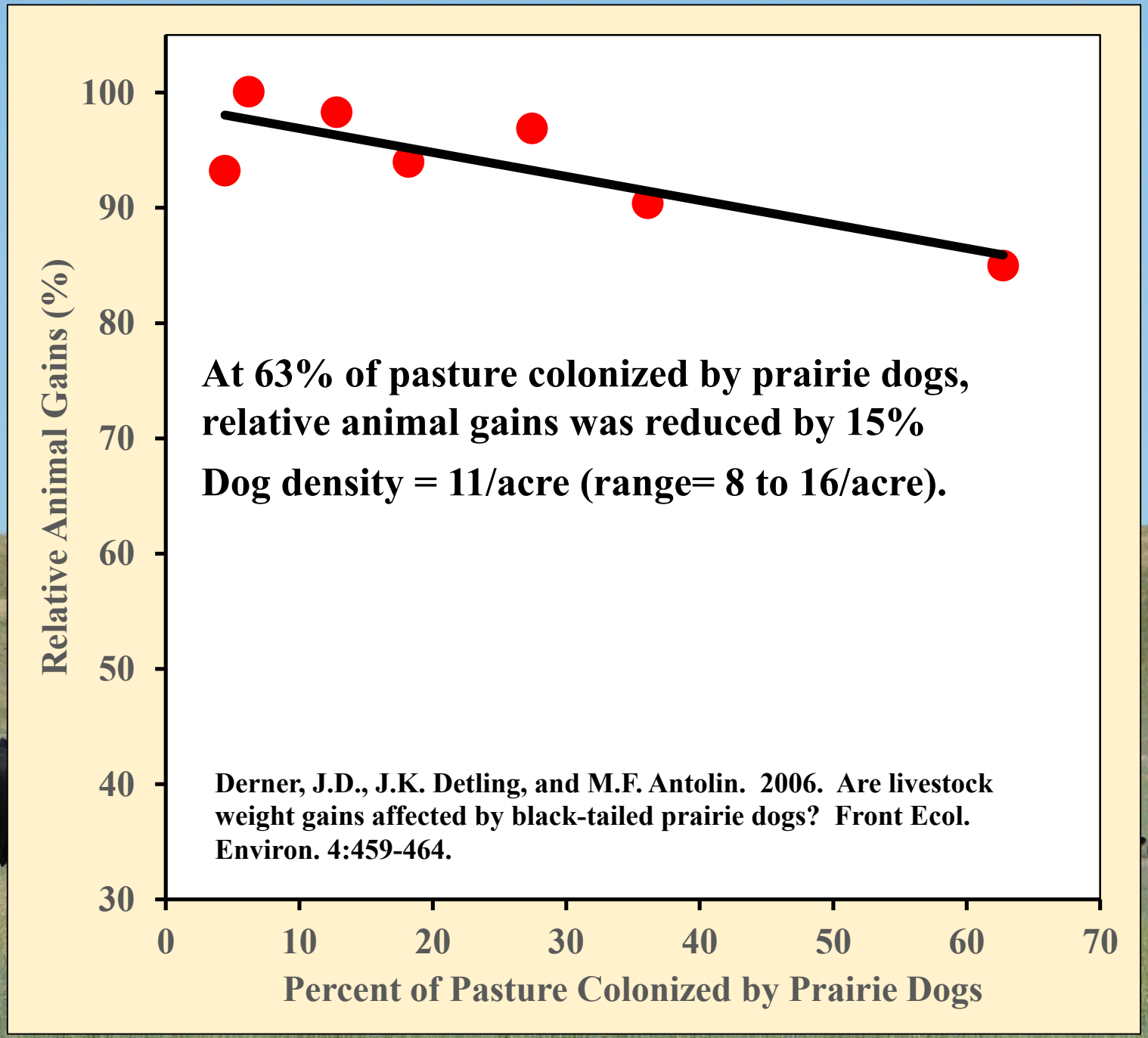
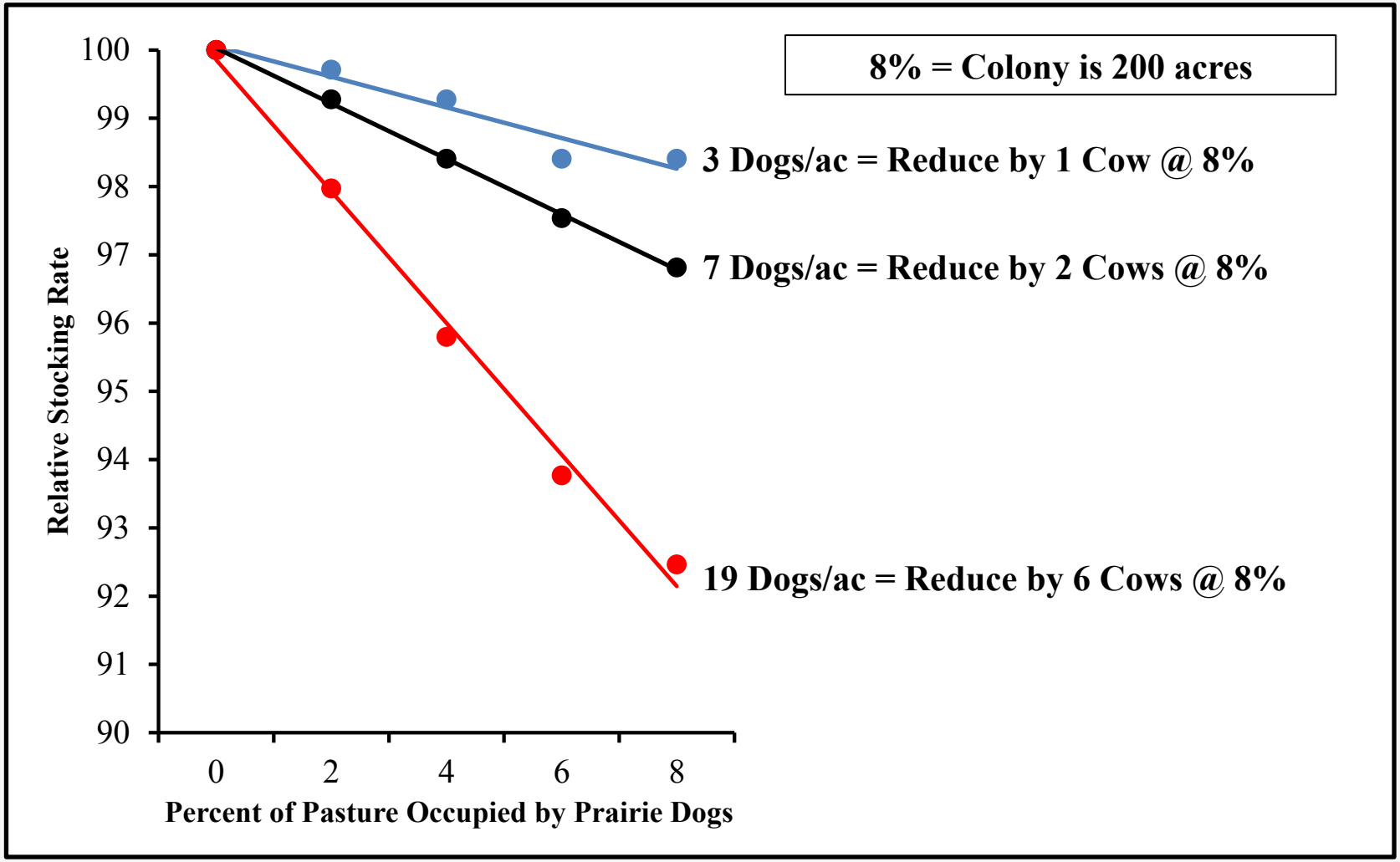

100
90
80
70
60
50
40
30
Relative Animal Gains (%)
0
10
20
30
40
50
60
70
Percent of Pasture Colonized by Prairie Dogs
At 63% of pasture colonized by prairie dogs, relative animal gains was reduced by 15%
Dog density = 11/acre (range= 8 to 16/acre).
Derner, J.D., J.K. Detling, and M.F. Antolin. 2006. Are livestock weight gains affected by black-tailed prairie dogs? Front Ecol. Environ. 4:459-464.

Table 2: Miller et al. 2007, Journal of Wildlife Management 71:2801-2810 (Initial Stocking Rate 69 Cows/2500ac for 6 Months—No PDs)



Assume: Recommended stocking rate of 2.4 ha/AUM,
Prairie Dog Consumption 31 grams (1.1 oz)/dog/day
60% Dietary Overlap